SPECIAL OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING SEPTEMBER, 1920.

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[Solar Radiation Investigation Section, Washington, Nov. 1, 1920.]

For a description of instruments and exposures, and an account of the method of obtaining and reducing the measurements, the reader is referred to this REVIEW for April, 1920, 48:225.

The monthly means and departures from normal in Table 1 indicate that solar radiation intensities were close to normal values at Washington, D. C., and Madison, Wis., and above normal at Lincoln, Nebr., and Santa Fe, N. Mex. At the latter station at noon on September 27, with air mass 1.26, the intensity measured 1.625 calories per minute per square centimeter. This is the highest radiation intensity ever measured at Santa Fe in September. From the intensities measured between this time and 4:40 p. m., when the air mass had increased to 3.80, an atmospheric transmission coefficient of 0.902 is obtained, and extrapolation to zero air mass gives a radiation intensity of 1.84 calories or 1.85 calories if reduced to mean solar distance of the earth.

For the month as a whole there was an excess in the total radiation received on a horizontal surface at all three stations, although for the week beginning with September 3 all stations show a deficiency.

Skylight polarization measurements obtained on 11 different days at Washington give a mean of 58 per cent and a maximum of 67 per cent on the 17th. Measurements obtained at Madison on 11 days give a mean of 69 per cent, and a maximum of 75 per cent on the 16th. These are about average values for September for the respective stations.

TABLE 1.—*Solar radiation intensities during September, 1920.*

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Suns zenith distance. 8 a.m.	78.7	75.7	70.7	60.0	0.0	60.0	70.7	75.7	78.7	Noon.
	75th meridian time.	Air mass. A. m.					P. m.				Local mean solar time.
	e.	5.0	4.0	3.0	2.0	1.0*	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Sept. 1	12.24	.....	.....	.....	.....	1.42	1.10	.....	.....	.....	9.47
2	9.14	.....	.....	.....	1.12	1.47	.....	.....	.....	.....	7.29
3	9.47	.....	.....	.....	1.24	1.45	.....	.....	.....	.....	7.57
13	15.11	.....	.....	.....	0.96	1.24	.....	.....	.....	.....	10.21
14	9.83	.....	.....	.....	1.19	1.40	1.16	0.97	.....	.....	9.14
15	10.21	.....	0.79	0.93	1.10	1.27	.....	.....	.....	.....	10.97
16	13.13	.....	.....	.....	0.88	.....	0.92	0.41	.....	.....	14.10
17	7.29	.....	0.98	1.12	1.28	1.46	1.20	1.00	0.84	.....	7.29
18	9.14	.....	0.71	0.83	1.00	1.34	1.04	0.86	0.74	.....	9.83
20	6.76	.....	.....	.....	.....	.....	0.99	0.82	0.63	.....	7.04
21	9.83	.....	.....	.....	.....	1.14	0.84	0.64	0.54	.....	8.18
22	11.38	.....	.....	.....	.....	1.24	1.01	0.78	0.64	.....	12.24
25	17.37	.....	.....	.....	1.02	1.22	0.96	0.78	0.65	.....	18.59
28	16.20	.....	.....	.....	.....	.....	.....	0.96	0.84	0.73	13.61
29	13.13	.....	.....	.....	0.98	.....	.....	.....	.....	.....	10.97
Means	.....	.....	0.83	0.96	1.08	1.33	1.02	0.80	0.70	(0.73)	.....
Departures	.....	.....	+0.10	+0.07	+0.01	+0.01	−0.03	−0.06	−0.03	+0.06	.....

* Extrapolated.

TABLE 1.—*Solar radiation intensities during September, 1920*—Contd.

Madison, Wis.

[Gram-calories per minute per square centimeter of normal surface.]

Date.	Suns zenith distance. 8 a.m.	78.7	75.7	70.7	60.0	0.0	60.0	70.7	75.7	78.7	Noon.
	75th meridian time.	Air mass. A. m.					P. m.				Local mean solar time.
	e.	5.0	4.0	3.0	2.0	1.0*	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Sept. 2	8.81	0.80	0.91	1.03	1.17	1.33	.....	.....	.....	.....	7.29
7	9.83	.....	.....	.....	1.04	1.33	.....	.....	.....	.....	8.48
14	12.68	.....	.....	.....	1.14	1.32	1.02	0.88	.....	.....	13.61
15	19.23	.....	.....	.....	.....	.....	1.24	1.09	0.97	.....	16.20
16	7.29	0.95	1.04	1.15	1.30	1.46	1.26	1.10	0.98	0.89	9.14
17	8.18	.....	.....	.....	.....	1.46	1.16	0.90	.....	.....	8.48
18	9.83	.....	.....	.....	1.08	1.34	.....	0.84	0.68	.....	11.38
21	12.68	.....	.....	.....	.....	1.28	1.00	0.78	0.65	.....	12.68
24	15.65	.....	.....	.....	.....	1.45	1.24	1.01	0.97	.....	11.81
27	12.68	.....	.....	.....	.....	1.42	1.26	1.11	0.98	.....	6.50
28	6.02	.....	1.01	1.13	1.30	.....	.....	1.06	.....	.....	5.36
Means	.....	(0.88)	0.99	1.10	1.17	1.38	1.17	1.03	0.87	(0.89)	.....
Departures	.....	−0.02	+0.08	+0.09	±0.00	+0.02	+0.01	+0.02	+0.02	.....	.....

Lincoln, Nebr.

Sept. 1	12.68	.....	.....	.....	.....	.....	.....	.....	0.68	0.56	14.60
10	14.10	.....	.....	.....	1.20	.....	.....	.....	.....	.....	15.65
13	12.24	.....	.....	.....	1.19	.....	.....	.....	.....	.....	16.20
15	10.24	.....	.....	.....	1.21	1.42	.....	.....	0.96	0.87	7.04
16	7.29	.....	0.85	1.03	1.24	1.48	1.24	1.05	0.92	0.82	6.76
17	8.18	.....	.....	1.13	1.29	1.48	.....	.....	.....	.....	7.87
18	10.59	0.71	0.82	0.99	1.17	1.39	1.15	0.97	0.82	0.71	12.68
20	13.13	.....	0.66	0.80	.....	.....	.....	.....	.....	.....	16.20
21	10.21	0.83	0.90	1.01	1.17	1.31	.....	.....	.....	.....	11.81
24	16.20	0.94	1.02	1.14	1.29	1.47	.....	.....	.....	.....	10.59
25	9.47	.....	0.83	0.97	.....	.....	.....	.....	.....	.....	11.38
27	7.04	.....	.....	.....	1.33	.....	.....	.....	.....	.....	4.75
29	3.99	.....	1.05	1.18	.....	.....	.....	1.16	1.00	.....	4.37
30	4.17	.....	0.99	1.13	1.30	1.47	1.32	1.15	1.00	0.86	4.37
Means	.....	0.83	0.89	1.04	1.24	1.43	1.24	1.08	0.90	0.76	.....
Departures	.....	+0.07	+0.05	+0.05	+0.05	+0.04	+0.09	+0.11	+0.06	+0.02	.....

Santa Fe, N. Mex.

Sept. 2	8.81	0.88	0.99	.....	.....	.....	.....	.....	.....	.....	7.87
3	7.57	0.93	0.97	1.16	.....	.....	.....	.....	.....	.....	7.87
9	4.75	1.06	1.15	1.25	.....	1.62	1.40	1.24	.....	.....	4.37
10	3.45	1.12	1.21	1.32	1.45	1.59	1.43	1.24	1.15	.....	3.15
11	4.17	.....	.....	.....	.....	1.67	.....	.....	.....	.....	3.00
22	5.79	.....	.....	.....	.....	1.61	1.39	1.21	.....	.....	3.81
23	4.95	.....	.....	.....	.....	1.60	1.39	1.28	1.16	1.05	3.15
27	3.45	.....	.....	.....	.....	1.67	1.50	1.36	1.23	1.11	2.87
30	5.36	.....	.....	.....	1.30	.....	.....	.....	.....	.....	5.56
Means	.....	1.00	1.08	1.24	(1.38)	1.63	1.42	1.27	1.18	(1.08)	.....
Departures	.....	+0.04	+0.02	+0.08	+0.07	+0.10	+0.03	+0.04	+0.05	+0.08	.....

* Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface.*

[Gram-calories per square centimeter.]

Week beginning—	Average daily radiation.			Average daily departure for the week.			Excess or deficiency since first of year.		
	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Sept. 2	361	320	377	−33	−62	−65	−699	+ 597	.....
10	409	403	451	+27	+51	+34	−509	+ 955	.....
17	429	359	431	+60	+31	+35	− 86	+1,169	.....
24	295	333	450	−55	+29	+72	−474	+1,369	.....